

Title: MODULAR AND RECONFIGURABLE FROZEN

What is claimed is:

Modular And Reconfigurable Fr z n Cone Confection Manufacturing System

1. A modular and reconfigurable frozen cone confection manufacturing system, comprising:

 a plurality of conical confection shell grasping and retaining apparatuses;

 a transport mechanism for moving the plurality of conical confection shell grasping and retaining apparatuses from a first point to a second point; and

 a plurality of individual manufacturing stations, each manufacturing station adapted to perform one or more manufacturing process steps as conical confection shell grasping and retaining apparatuses containing conical confection shells pass by;

 wherein one or more of the plurality of manufacturing stations is adapted for relocation to various points along the length of the transport mechanism;

 whereby the dwell time between process steps can be adjusted by moving the appropriate manufacturing station(s); and

 whereby frozen cone confections having different manufacturing parameters can be manufactured by the same system.

2. A system according to claim 1 wherein the position of certain components of one or more of the manufacturing stations can be adjusted with respect to open ends of the conical shells.

3. A system according to claim 1 wherein the one or more manufacturing stations adapted for relocation to various points along the length of the transport mechanism are automatically relocated as needed.

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4. A system according to claim 3 wherein a servo motor and drive means is provided to automatically relocate each appropriate manufacturing station.
5. A system according to claim 1 wherein one of the plurality of individual manufacturing stations is a rim dipping station that is adapted to coat an open end edge of each conical shell with a coating material while the conical shell(s) is in an inverted position.
6. A system according to claim 1 wherein one of the plurality of individual manufacturing stations is a cone coating station that is adapted to coat the interior of each conical shell with a coating material while the conical shell(s) is in an inverted position.
7. A system according to claim 1 further comprising a processor-based control system for controlling the operation the plurality of individual manufacturing stations and the transport mechanism.
8. A system according to claim 7 wherein relocation of one or more of the plurality of individual manufacturing stations occurs automatically as a result of the control system receiving an input indicating that a particular frozen cone confection is to be manufactured.
9. A modular and reconfigurable frozen cone confection manufacturing system, comprising:
 - a frozen cone confection manufacturing line having:
 - a plurality of conical confection shell grasping and retaining apparatuses, each of the plurality of conical confection shell grasping and

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retaining apparatuses adapted to grasp and retain conical confection shells

whether in an upright or inverted position;

a means of loading conical confection shells to the plurality of conical confection shell grasping and retaining apparatuses;

a transport mechanism for moving the plurality of conical confection shell grasping and retaining apparatuses along the length of a frozen cone confection manufacturing line;

a plurality of relocatable manufacturing stations, each relocatable manufacturing station adapted for relocation to various points along the length of the manufacturing line and further adapted to perform one or more frozen cone confection manufacturing process steps as conical confection shell grasping and retaining apparatuses containing conical confection shells pass by, each manufacturing station comprising:

(1) an actuating assembly, the actuating assembly further comprising:

(a) a pair of vertical support members adapted to reside on opposite sides of the transport mechanism, and designed to support manufacturing components used to perform specific manufacturing process step(s) with which the manufacturing station is tasked,

(b) a vertical lift unit having a drive means operative to adjust the distance of the manufacturing components from the open end of the conical shells, and

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(c) at least one guide for directing movement of the manufacturing station along the length of the manufacturing line;

(2) manufacturing components used to perform specific manufacturing process step(s) with which the manufacturing station is tasked, and

(3) a supply of material, or a means for connection to a supply of material, for use in the specific manufacturing process step(s) with which the manufacturing station is tasked,

a means of unloading conical confection shells from the plurality of conical confection shell grasping and retaining apparatuses; and

a processor-based control system for providing data regarding the manufacturing process to the plurality of relocatable manufacturing stations and for controlling the operation of the plurality of relocatable manufacturing stations and the transport mechanism;

whereby the plurality of relocatable manufacturing stations are repositioned as needed along the length of the manufacturing line in order to manufacture frozen cone confections having dissimilar manufacturing parameters.

10. A system according to claim 9 further comprising a manufacturing station relocation unit having a drive means operable to automatically relocate the manufacturing station to a different point along the length of the manufacturing line.
11. A system according to claim 10 wherein the drive means includes a servo motor.

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12. A system according to claim 9 further comprising one or more robots for performing loading and/or unloading tasks.
13. A system according to claim 9 further comprising one or more additional manufacturing lines.
14. A system according to claim 9 wherein the plurality of relocatable manufacturing stations are automatically repositioned along the length of the manufacturing line as a result of the processor-based control system receiving an input indicating that a particular frozen cone confection is to be manufactured.
15. A system according to claim 14 wherein the input is in the form of a program number that corresponds to a particular frozen cone confection.
16. A system according to claim 14 wherein the input is in the form of a program name that corresponds to a particular frozen cone confection.
17. A system according to claim 9 further comprising a database in communication with the processor-based control system, the database containing manufacturing data relating to one or more different frozen cone confections.
18. A system according to claim 17 wherein the processor-based control system receives manufacturing process control data from the database.
19. A system according to claim 9 wherein the processor-based control system receives manufacturing process control data from a computer readable medium.
20. A system according to claim 9 wherein additional relocatable manufacturing stations can be installed to the manufacturing line.
21. A system according to claim 9 wherein one of the plurality of relocatable manufacturing stations is a rim dipping station that is adapted to coat an open end

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edge of the conical shells with a coating material while the conical shells are in an inverted position.

22. A system according to claim 9 wherein one of the plurality of relocatable manufacturing stations is a cone coating station that is adapted to coat the interior of the conical shells with a coating material while the conical shells are in an inverted position.